* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]Although an image pick-up tube and solid state image pickup devices, such as a CCD area sensor, are used as an imaging device now as for this invention, there is an advantage, like the solid state image pickup device is compact as compared with an image pick-up tube, and there are few afterimages accompanying printing.
[0002]This solid state image pickup device constitutes the imaging surface from a photo detector which performs photoelectric conversion.
As for resolution, a maximum is determined by the formation density (array pitch of a photo detector) of this photo detector.
Considering the case where made the object image into the input signal and it is spatially sampled in the pitch of a photo detector, specifically with a solid state image pickup device, only the resolution to one half of the Nyquist rates of a sampling period is obtained by a sampling theorem.
[0003]Although what is necessary is just to carry out densification of the photo detector in order to make resolution high, manufacturing difficulty is followed on densification and there is a problem that a manufacturing cost becomes high.
[0004]Then, as a method of high-resolution-izing with the same pixel number, it carries out [******] and flume crack ****** is used. This shifts the relative location of an image sensor to an object image, acquires two or more picture information, and creates a high-definition picture from two or more of these picture information.
[0005]As a method which shifts the relative location of an object image and an image sensor, there are mainly two methods. It is a method which actually displaces the relative location of an object image and an image sensor, and obtains two or more picture information serially as the 1st method.

[0006]It is a method which what is called a multi-board type carries out [******], is called method as the 2nd method, creates two or more object images optically, forms two or more image sensors to each of the photographic subject, and is shifted to each object image. Since this method has obtained two or more picture information using two or more object images and two or more image sensors, there is the strong point in which two or more picture information is obtained at the period, but in order to acquire two or more object images, an imaging optical system becomes complicated, and two or more image sensors are needed, and there is a problem that a device becomes expensive. Therefore, the direction of the 1st method has the advantage that a device becomes cheap as compared with the 2nd method, and this invention is also using this method. Hereafter, the example currently concretely indicated as the 1st method is explained.

[0007]For example, in JP,59-13476,A, an image formation face is optically displaced by half a pitch horizontally to a photo detector, the object image before and behind displacement is compounded, a horizontal sampling frequency is doubled, and the image pick-up mechanism which doubles horizontal resolution is indicated.

[0008]In JP,61-176907,A, the imaging device which performs pixel ****** by displacing the position of an object image is indicated by displacing the parallel plate glass of the front face of an image sensor.

[0009]In JP,8-37628,A, a rotating prism is moved, multiple times are picturized, performing pixel ****** of an image sensor, before long, as composition which changes a light exposure, it is high resolution and the imaging device which acquires the picture which has an extensive dynamic range is indicated once [at least].

[0010]

[Problem(s) to be Solved by the Invention]However, in the above-mentioned conventional technology, in the case of the imaging device using the image sensor arranged in two dimensions, in order level and to make high resolution-ization attain about vertical both directions, a biaxial displacement means is needed, and there is a problem that a device becomes a high cost.

[0011]Drawing 18 is an outline lineblock diagram showing the mounting structure of the biaxial displacement means (actuator) which displaces an image sensor. As shown in drawing 18, in order to raise the level and vertical bidirectional resolution of an image sensor, the two actuators (for example, laminated piezoelectric element) 13X and 13Y must be used.

[0012]In the mounting structure shown in drawing 18, the two actuators 13X and 13Y are used. The actuator 13X connects one end to the substrate 15, and supports the element holder 14 by the other end. The actuator 13X moves the element holder 14 of the image sensor 12 to an arrow X direction (horizontal) (displacement). That is, in order to move the imaging range of the image sensor 12 horizontally, it is arranged horizontally. The actuator 13Y connects one

end to the substrate 15, and supports the element holder 14 by the other end. The actuator 13Y moves the element holder 14 of the image sensor 12 in the direction (perpendicular direction) of arrow Y (displacement). That is, in order to move the imaging range of the image sensor 12 perpendicularly, it is arranged vertically.

[0013]Drawing 19 is a figure showing the pixel of an image sensor typically. It is made for the pixel in the position of ** to be displaced to the position of ** with the actuator 13X, and it is necessary to rank second and to make it the pixel in the position of ** displaced to the position of ** with the actuator 13Y, as it shows in drawing 19 by 1 pixel, in horizontal and making it an image sensor displaced perpendicularly. The actuator of 1 is used for this invention and it proposes the imaging method with which the same effect as it having been horizontal and having made it displaced perpendicularly is acquired.

[0014]In light of the above-mentioned problems, this invention is a thing.

The purpose is to provide the imaging device which can acquire the picture of high resolution.

[0015]

[Means for Solving the Problem]In order to attain an aforementioned problem, an imaging device concerning claim 1, An imaging optical system which carries out image formation of the object image, and an image sensor which samples spatially said object image by which image formation was carried out with a photo detector arranged on two dimensions, and outputs picture information, A displacement means which makes it relative location of said object image and said image sensor displaced to one way, When it has a signal processing means which generates image composing information based on picture information in which said relative location was displaced, and picture information before displacement and relative location of said object image and said image sensor is displaced to one way by said displacement means, Relative location of said object image and said image sensor had composition which obtains picture information which was horizontal and was displaced perpendicularly.

[0016]According to the imaging device concerning claim 1, you make it relative location of an object image and an image sensor displaced to one way by a displacement means, Since it is adapted to generate image composing information based on picture information in which picture information to which relative location of an object image and said image sensor was horizontal, and was displaced perpendicularly was obtained, and the relative location concerned was displaced, and picture information before displacement, It becomes possible to provide a horizontal imaging device which vertical resolution can be raised and can acquire a picture of high resolution by low cost using a displacement means (for example, actuator of 1) of 1.

[0017]In an imaging device concerning claim 1, an imaging device concerning claim 2 said

displacement means, To said object image, said image sensor was horizontal, or said relative location had composition which displaces relative location of said object image and said image sensor so that it might be displaced at a fixed angle to a perpendicular direction.

[0018]According to the imaging device concerning claim 2, a displacement means, To an object image, since relative location is horizontal or the composition of displacing relative location of an object image and an image sensor so that it may be displaced at a fixed angle to a perpendicular direction, a photo detector of an image sensor, It becomes possible using a displacement means (for example, actuator of 1) of 1 to provide a horizontal imaging device which vertical resolution can be raised and can acquire a picture of high resolution by low cost by an easy method.

[0019]In an imaging device which an imaging device concerning claim 3 requires for claim 1 or 2, it was presupposed that it shifts by turns and said photo detector is arranged by odd number sequence and an even number sequence.

[0020]According to the imaging device concerning claim 3, a photo detector, Since it is the composition arranged by shifting by turns by odd number sequence and an even number sequence, using a displacement means (for example, actuator of 1) of 1 with easy composition. It becomes possible to provide a horizontal imaging device which vertical resolution can be raised and can acquire a picture of high resolution by low cost.

[0021]In an imaging device which requires an imaging device concerning claim 4 for claim 3, a ratio of an array pitch of a horizontal direction and a perpendicular direction considered said photo detector as composition which is root3:2.

[0022]Since it is the composition which set a ratio of an array pitch of a horizontal direction of a photo detector, and a perpendicular direction to root3:2 according to the imaging device concerning claim 4, as compared with square arrangement, about 15%, a sampling pitch can be lengthened and can be sampled efficiently.

[0023]In an imaging device which an imaging device concerning claim 5 requires for claim 3 or 4, to said object image, said relative location considered said displacement means as composition which displaces relative location of said object image and said image sensor so that said image sensor might be displaced horizontally.

[0024]Since according to the imaging device concerning claim 5 relative location is the composition of displacing relative location of an object image and an image sensor as an image sensor is horizontally displaced to an object image, It becomes possible using a displacement means (for example, actuator of 1) of 1 to provide a horizontal imaging device which vertical resolution can be raised and can acquire a picture of high resolution by low cost by an easy method.

[0025]In an imaging device which an imaging device concerning claim 6 requires for claim 1 or 2, it was presupposed that it shifts by turns and said photo detector is arranged by odd lines

and even lines.

[0026]According to the imaging device concerning claim 6, a photo detector, Since it is the composition arranged by shifting by turns by odd lines and even lines, using a displacement means (for example, actuator of 1) of 1 with easy composition. It becomes possible to provide a horizontal imaging device which vertical resolution can be raised and can acquire a picture of high resolution by low cost.

[0027]In an imaging device which requires an imaging device concerning claim 7 for claim 6, a ratio of an array pitch of a horizontal direction and a perpendicular direction considered said photo detector as composition which is 2:root3.

[0028]Since it is the composition which set a ratio of an array pitch of a horizontal direction of a photo detector, and a perpendicular direction to 2:root3 according to the imaging device concerning claim 7, as compared with square arrangement, about 15%, a sampling pitch can be lengthened and can be sampled efficiently.

[0029]In an imaging device which an imaging device concerning claim 8 requires for claim 6 or 7, to said object image, said relative location considered said displacement means as composition which displaces relative location of said object image and said image sensor so that an image sensor might be displaced perpendicularly.

[0030]Since according to the imaging device concerning claim 8 relative location is the composition of displacing relative location of an object image and an image sensor as an image sensor is perpendicularly displaced to an object image, It becomes possible using a displacement means (for example, actuator of 1) of 1 to provide a horizontal imaging device which vertical resolution can be raised and can acquire a picture of high resolution by low cost by an easy method.

[0031]In an imaging device which an imaging device concerning claim 9 requires for any one of the claims 1-8, said displacement means was considered as composition which changes the number of times of displacement according to imaging mode.

[0032]According to the imaging device concerning claim 9, since it is the composition of changing the number of times of displacement according to imaging mode, a displacement means becomes possible [acquiring a high-definition picture according to imaging mode].

[0033]In an imaging device which an imaging device concerning claim 10 requires for any one of the claims 1-9, said displacement means is the composition of displacing said imaging optical system or said image sensor.

[0034]According to the imaging device concerning claim 10, since it is the composition of displacing an imaging optical system or an image sensor, a displacement means is easy composition and it becomes possible to displace relative location of an object image and an image sensor of it.

[0035]

[Embodiment of the Invention]Hereafter, the suitable embodiment of this invention is described with reference to figures.

[0036]Drawing 1 is a figure showing the outline composition of the imaging device concerning this embodiment. Especially the imaging device shown in drawing 1 is an example of composition of the method which displaces an image sensor, when displacing the relative location of an object image and an image sensor to one way.

[0037]The imaging unit 1 in which the imaging device shown in drawing 1 outputs the picture information of a photographic subject, It is constituted by the system controller 4 grade which controls each part of the signal processing part 3 which generates and outputs composite image data based on A/D converter 2 which carries out the analog to digital of the picture information, and outputs image data, the picture information before displacement, and the picture information after displacement, and an imaging device.

[0038]The imaging unit 1 is provided with the following.

The image sensor 12 which is formed so that the imaging optical system 11 which carries out image formation of the object image, and movement (displacement) are possible, samples spatially the object image by which image formation was carried out by the imaging optical system 11 with the photo detector arranged on two dimensions, and outputs picture information.

The displacement means 13 which displaces the image sensor 12 to one way to an object image, and performs pixel ******.

The output of the image sensor 12 is combined with A/D converter 2.

[0039]The signal processing part 3 is a unit which processes by ****** carrying out, for example, and has the image memory. The signal processing part 3 stores the image data before displacement of the image sensor 12 in an image memory, and specifically. The image data after displacement of the image sensor 12 is stored in an image memory, composite image data is generated based on the image data before displacement, and the image data after displacement, high definition-ization in the same photographic subject is performed, and the image data for one sheet is obtained eventually.

[0040]the system controller 4 is connected to each unit of the imaging unit 1, A/D converter 2, and the signal processing part 3 -- imaging operation and an A/D conversion -- ****** carrying out -- etc. -- operation etc. are controlled. The system controller 4 comprises a microcomputer etc., is operating a microcomputer according to the various programs beforehand memorized to ROM, and performs control of each unit.

[0041]Drawing 2 is a circuit diagram showing the concrete example of composition of the image sensor 12.

[0042]The image sensor 12 has CCD part 121 and the signal detection part 122. CCD part 121 has photo detector (for example, photo-diode) PD-- arranged at matrix form, and VCCD of

photo detector PD-- which transmits a vertical electric charge and HCCD which transmits the horizontal electric charge of photo detector PD--.

[0043]Photo detector PD-- receives the light which entered into the imaging optical system 11, performs photoelectric conversion, and transmits an electric charge to VCCD and HCCD. VCCD and HCCD output the transmitted electric charge to the signal detection part 122. The signal detection part 122 transforms the inputted electric charge into voltage, and outputs it to A/D converter 2 by making this into picture information (analog picture signal).

[0044]Next, the displacement means 13 is explained. Drawing 3 is an outline lineblock diagram showing displacement means 13 ********** within the image pick-up block 2. In the example shown in drawing 3, the actuator is used as a displacement means.

[0045]The actuator 13C (for example, lamination type piezoelectric element) connects one end to the substrate 15, and is supporting the element holder 14 which attached the image sensor 12 by the other end. The element holder 14 moves in the direction of arrow M by the operation of the actuator 13C.

[0046]This actuator 13C changes an imaging range to the direction of level, perpendicularity, or slant (a vertical angle is included) according to the mounting angle within the image pick-up block 2 (actuator 13 C pixels are shifted and it operates). In the example shown in this figure, the actuator is aslant attached to the image sensor 12.

[0047]The principle of operation of pixel ****** of the imaging device of the above-mentioned composition is explained.

[0048](Example 1) Drawing 4 shows the simplified schematic of the arrangement of the photo detector in the above-mentioned image sensor 12. In the example shown in drawing 4, Masakata arrangement of photo detector (henceforth "pixel") PD is carried out by picture element pitch (it is also called "array pitch") P. By the displacement means 13, pixel PD displaces the image sensor 2 by which square arrangement was carried out to the horizontal direction of a pixel in the direction of angle theta (angle which receives horizontally). Here, it is considered as theta=$\tan^{-1}$ (1/10) (1 angle displaced to a 1-pixel perpendicular direction when 0 pixel is displaced horizontally), for example.

[0049]Drawing 5 is shown and the example which displaced the image sensor 12 shown in drawing 4 in the direction of angle theta to the horizontal direction of a pixel drawing 6, The example which displaced horizontally half a pixel (0.5P) of image sensors 12 shown in drawing 4 at the angle theta to the horizontal direction of a pixel is shown, and drawing 7 shows the example which is the angle theta and displaced horizontally 5 pixels (5P) of image sensors 12 shown in drawing 4 to the horizontal direction of a pixel. Only the typical pixel is shown in order to explain simply in drawing 6 and drawing 7.

[0050]In drawing 5, the pixel before displacement is made into P1, P2, and ..., and the pixel after corresponding displacement is made into P1', P2', and ... When half a pixel of image

sensors 2 are horizontally displaced at the angle theta to the horizontal direction of a pixel, becoming the same as the time of carrying out half a pixel (1/2P) displacement almost horizontally, as shown in drawing 6, and receiving the horizontal direction of a pixel in another side and the image sensor 12 -- the angle theta -- 5 -- when half a pixel (5P) is displaced horizontally, as shown in drawing 7, half a pixel can be displaced vertically.

[0051]Drawing 8 shows the pixel before the displacement at the time of being the angle theta and displacing horizontally 5 pixels of image sensors 12 of drawing 4 to the horizontal direction of a pixel, and the pixel after displacement. As shown in drawing 8, it becomes equivalent to what displaced half a pixel of perpendicular directions by making the 1st (P1') displaced pixel correspond with the 6th (P6) pixel before being displaced. That is, displacement almost equivalent to level or displacement of a pixel biaxial with the displacement means of one axis in giving some angle to a perpendicular direction and displacing an image sensor can carry out. However, as shown in drawing 6, some error may arise. Then, this error is cancelable by moving horizontally the image sensor like drawing 9 with which half a pixel of pixels shifted mutually in the odd number sequence and the even number sequence.

[0052](Example 2) Drawing 9 shows the example which shifted mutually half a pixel of pixels of the above-mentioned image sensor 12 by the odd number sequence and the even number sequence. Drawing 10 is shown and the example which carried out half a pixel (0.5P) displacement of the image sensor 12 shown in drawing 9 horizontally to the pixel drawing 11, The example which carried out 1-pixel (1P) displacement of the image sensor 12 shown in drawing 9 horizontally to the pixel is shown, and drawing 12 shows the example which carried out 1.5-pixel (1.5P) displacement of the image sensor 12 shown in drawing 9 horizontally to the pixel. Only the typical pixel is shown in order to explain simply in drawing 10 - drawing 12.

[0053]Drawing 13 is a figure for explaining the picture information which each pixel acquires a displacement front and after displacement, when the image sensor shown in drawing 9 is displaced horizontally.

[0054]Drawing 13 (A) Picture information of each pixel before displacement is set to D0, and D2 and pixel information of a pixel displaced 1.5 pixels horizontally are set [the picture information of the pixel displaced half a pixel horizontally] to D3 for D1 and the picture information of a pixel displaced 1 pixel horizontally so that it may be shown. That is, when 1.5 pixels of image sensors 12 are displaced horizontally, as they are shown in drawing 13 (B) 1 pixel half a pixel, the four picture information D0, D1, D2, and D3 can be obtained about 1 pixel. This becomes equivalent to the picture information sampled by the sampling pitch of the half of a picture element pitch like the case where above-mentioned drawing 4 shows. That is, acquisition of information (2 m x 2 n) is attained only by displacing horizontally the image sensor which has a pixel of mxn, and a sampling pitch is made 4 times. The picture information D0 before displacement and the picture information D2 displaced 1 pixel will be obtained at the

case of having displaced 1 pixel of pixels, and a vertical sampling pitch is doubled.

[0055]Drawing 14 is a figure for explaining the picture information from which each pixel acquires the image sensor shown in drawing 9 a displacement front and after displacement when an oblique direction is displaced.

[0056]As shown in drawing 14 (A), picture information of each pixel before displacement is set to D0, and pixel information of the pixel which displaced the picture information of the pixel which displaced the picture information of the pixel which displaced the oblique direction horizontally [half a pixel] at a level [1 pixel] with D1 and an oblique direction at a level [1.5 pixels] with D2 and an oblique direction is set to D3. That is, when 1.5 pixels of oblique directions are displaced horizontally half a pixel of image sensors [1 pixel of] 12, as it is shown in drawing 14 (B) in them, the four picture information D0, D1, D2, and D3 can be obtained about 1 pixel.

[0057](Example 3) Drawing 15 shows the example which shifted mutually half a pixel of pixels of the above-mentioned image sensor 12 by even lines with odd lines. The same effect as what showed **** shown in drawing 15 and the image sensor which half a pixel of pixels shifted mutually by even lines with odd lines, and arranged by above-mentioned drawing 9 by displacing a perpendicular direction or an oblique direction to the photo detector can be acquired.

[0058]That is, if the image sensor of the pixel arrangement like drawing 9 or drawing 15 is used, the same picture information as the case where a 2-way is displaced can be obtained by displacement of one way.

[0059](Example 4) Drawing 16 shows the example which set to 2:root3 the ratio of the picture element pitch of the horizontal direction and perpendicular direction of the pixel of an image sensor shown in drawing 15. When a pixel is arranged so that picture element pitch P_H horizontal like drawing 16 and vertical picture element pitch P_V may be set to 2:root3, Also in the time only of the information chisel of the origin which the renewal function which reproduces the HARASHIN item becomes complicated since it becomes a hexagonal array, but is not displaced, compared with square arrangement, about 15%, a sampling pitch can be lengthened and can be sampled efficiently.

[0060]They are picture element pitch P_H horizontal about the image sensor of composition of having shifted the pixel mutually by the odd number sequence and the even number sequence as shown in drawing 9, and vertical picture element pitch P_V root3 : The same effect can be acquired by arranging a pixel so that it may be set to 2.

[0061](Example 5) In the imaging device of this invention, it is good also as composition which changes the number of times of displacement of an image sensor according to imaging mode. for example, only the picture information (D0) of the 1st page (a pixel -- it shifts and nothing)

being used in the case of a normal mode, and in the case of a high-quality mode. The picture information (D0, D1) of the 2nd page (pixel shifting 1 time) is used, and, in the case of horizontal / vertical high-quality mode, it is good also as composition which uses the picture information (D0, D1, D2, D3) of the 4th page (pixel shifting 4 times).

[0062]In the imaging device using the image sensor shown in drawing 9 or drawing 15, when picturizing an animation, the picture information of D1, the picture information of D2, and the picture information of D3 can be applied also to an animation by displaying one by one after displaying the picture information of D0.

[0063](Modification of an imaging device) With the imaging device of drawing 1, when the relative location of an object image and an image sensor was displaced to one way, the example which displaces an image sensor was shown, but. As shown in drawing 17, when displacing the relative location of an object image and an image sensor to one way, it is good also as composition which displaces the imaging optical system 11. In short, what is necessary is just the composition which can be displaced in the relative location of an object image and an image sensor.

[0064]Drawing 17 shows the modification of the composition of an imaging device. In drawing 17, the portion which has drawing 1 and an equivalent function has attached identical codes, and the explanation is omitted. The imaging device of drawing 17 is the composition same about the imaging device shown in drawing 1, and A/D converter 2, the signal processing part 3 and the system controller 4, and only the composition of imaging unit 1' differs. That is, displacement means 13' in this imaging unit 1' is the composition of displacing the imaging optical system 11 so that it may displace the relative location of an object image and an image sensor.

[0065]In [as explained above] this embodiment, You make it the relative location of an object image and an image sensor displaced to one way by the displacement means 13, The relative location of an object image and said image sensor obtains the picture information which was horizontal and was displaced perpendicularly, Since the signal processing part 13 is adapted to generate image composing information based on the picture information in which the relative location concerned was displaced, and the picture information before displacement, It becomes possible to provide the horizontal imaging device which vertical resolution can be raised and can acquire the picture of high resolution by low cost using the displacement means (for example, actuator of 1) of 1.

[0066]The image sensor of this invention is applicable also to the thing of which method of all the pixel read systems and a field reading system.

[0067]

[Effect of the Invention]As explained above, according to the imaging device concerning claim 1, by a displacement means. The picture information to which it was made for the relative

location of an object image and an image sensor to be displaced to one way, and the relative location of an object image and said image sensor was horizontal, and was displaced perpendicularly is obtained, Since it is adapted to generate image composing information based on the picture information in which the relative location concerned was displaced, and the picture information before displacement, It becomes possible to provide the horizontal imaging device which vertical resolution can be raised and can acquire the picture of high resolution by low cost using the displacement means (for example, actuator of 1) of 1.

[0068]According to the imaging device concerning claim 2, a displacement means, To an object image, since relative location is horizontal or the composition of displacing the relative location of an object image and an image sensor so that it may be displaced at a fixed angle to a perpendicular direction, the photo detector of an image sensor, It becomes possible using the displacement means (for example, actuator of 1) of 1 to provide the horizontal imaging device which vertical resolution can be raised and can acquire the picture of high resolution by low cost by an easy method.

[0069]According to the imaging device concerning claim 3, a photo detector, Since it is the composition arranged by shifting by turns by the odd number sequence and the even number sequence, using the displacement means (for example, actuator of 1) of 1 with easy composition. It becomes possible to provide the horizontal imaging device which vertical resolution can be raised and can acquire the picture of high resolution by low cost.

[0070]Since it is the composition which set the ratio of the array pitch of the horizontal direction of a photo detector, and a perpendicular direction to root3:2 according to the imaging device concerning claim 4, as compared with square arrangement, about 15%, a sampling pitch can be lengthened and can be sampled efficiently.

[0071]Since according to the imaging device concerning claim 5 relative location is the composition of displacing the relative location of an object image and an image sensor as an image sensor is horizontally displaced to an object image, It becomes possible using the displacement means (for example, actuator of 1) of 1 to provide the horizontal imaging device which vertical resolution can be raised and can acquire the picture of high resolution by low cost by an easy method.

[0072]Since a photo detector is composition arranged by shifting by turns by odd lines and even lines, It becomes possible to provide the horizontal imaging device which vertical resolution can be raised and can acquire the picture of high resolution by low cost with easy composition using the displacement means (for example, actuator of 1) of 1.

[0073]Since it is the composition which set the ratio of the array pitch of the horizontal direction of a photo detector, and a perpendicular direction to 2:root3 according to the imaging device concerning claim 7, as compared with square arrangement, about 15%, a sampling pitch can be lengthened and can be sampled efficiently.

[0074]Since according to the imaging device concerning claim 8 relative location is the composition of displacing the relative location of an object image and an image sensor as an image sensor is perpendicularly displaced to an object image, It becomes possible using the displacement means (for example, actuator of 1) of 1 to provide the horizontal imaging device which vertical resolution can be raised and can acquire the picture of high resolution by low cost by an easy method.

[0075]According to the imaging device concerning claim 9, since it is the composition of changing the number of times of displacement according to imaging mode, a displacement means becomes possible [acquiring the high-definition picture according to imaging mode].

[0076]According to the imaging device concerning claim 10, since it is the composition of displacing an imaging optical system or an image sensor, a displacement means is easy composition and it becomes possible to displace the relative location of an object image and an image sensor of it.

[Translation done.]